Red Locust in Southern Madagascar : suitable conditions for outbreaks and gregarious areas.

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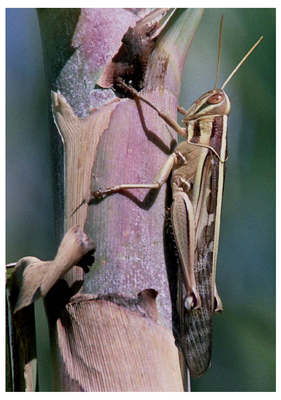

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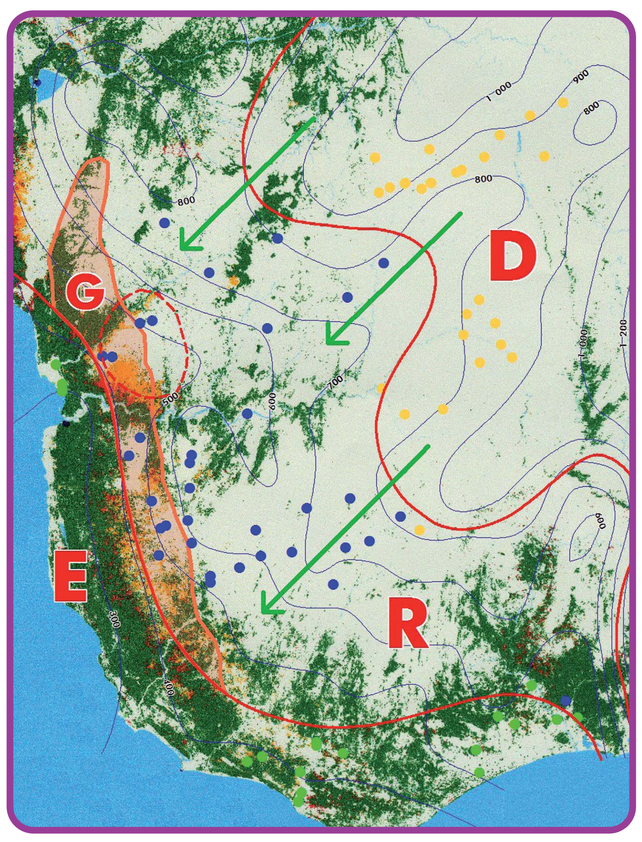
The Red Locust: adult of the solitary phase

Recent outbreaks of the Red Locust **Nomadacris septemfasciata** *Serville in Madagascar underlined the need for complementary research to improve understanding of population dynamics. Work was completed through field studies on a breeding site, investigations within rural populations and analyses of data from recent archives (2001-2007) collected at the National Anti locust Centre. This work leads to a finer comprehension of outbreak determinism and to a more precise delimitation of the zones most favourable for outbreaks and gregarisation.*

The key point for the success of breeding in the Red Locust (which has only one generation per year and an adult diapause during the dry season) is at the embryonic development level. December and January rains are of prime importance. A high breeding rate is related to good and regularly distributed rains throughout this period. A pluviometry of 250-300 mm /month seems the most favourable. Below 150 mm, the embryonic mortality is high. Rains above 400 mm are also unfavourable. The use of this criterion can allow an early localisation of the sites presenting a higher risk of outbreak.



The Red Locust in the South of Madagascar.

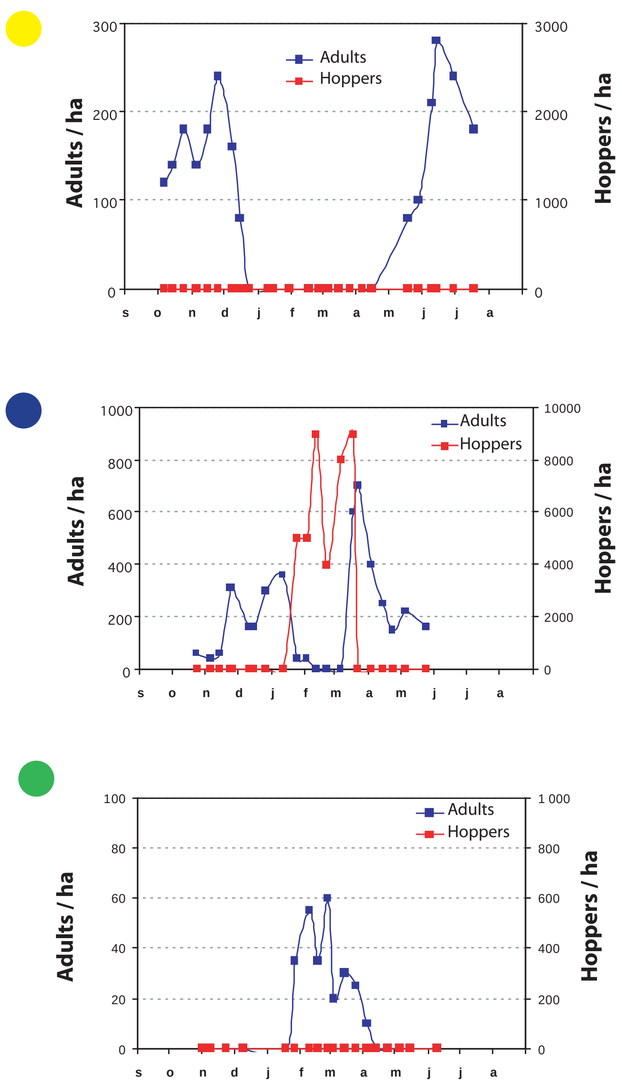
Biological cycle: coloured dots indicate the local biological cycle observed in each locality: blue for abundance of mature adults at the onset of the rainy season (October-December) and of nymphs during the rainy season (December-March), while almost no adults were present in the dry season; yellow indicate an almost complete absence of nymphs and the presence of immature adults in the dry season (March-September); green indicate the presence of just a few adults during the rainy season and nearly no nymphs at all.

Ecological areas: D, dry-season refuge area (> 800 mm of rain/year); R, main breeding area during the rainy season (400-800 mm of rain); E, limit area of the extreme-south (< 400 mm of rain); G, main outbreak area (synthesis taking into account data on biological cycle, breeding rates, rainfall, vegetation and soils).

Forest cover during recent years: green zones correspond to the forest cover in 2005 and the zones in red and orange represent the areas of recent deforestation (orange: zone deforested between 1990 and 2000; red: zones deforested between 2000 and 2005). Notice the important focus of deforestation at the south-western limit of the breeding area of the Red Locust. Source: International Conservation, 2005.

Migrations at the beginning of the rainy season: green arrows.

Monthly rainfall (mm): blue lines.



Density of the Red Locust on various biotopes.
Top: dry-season refuge area; middle: main breeding area; bottom: limit area of the far South.

In addition, the zones most favourable for gregarisation in Southern Madagascar were determined. These zones comprise several factors that are highly favourable for gregarisation :

- a massive arrival, at the beginning of the rainy season, of locust populations resulting from the dry season refugee zones and which are concentrated in restricted areas;
- a pluviometry allowing on average the best breeding rates observed in the south of the country;
- a recent deforestation that increased the surface area of biotopes that are potentially favourable for breeding.

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The Red Locust: mature female of the gregarious phase

As a result, an improvement of the strategy to control and prevent the Red Locust risk in Madagascar was proposed. This strategy should rest on:

- increased number of surveys in the main outbreak area, mainly at the beginning of the rainy season, to better assess the locust situation;
- improved observations to be collected on the Red Locust during surveys by reinforcing the training of the field officers (taking into account results of the current project);
- better pluviometry analysis at the beginning of the rainy season (December and January) and localization of the areas where it rains more 150 mm per month (with an special attention to the main outbreak area); a complementary analysis of the temporal distribution of the rains should make it possible to graduate the risk (the more the rains are regularly distributed, the more the risk is important; dry periods of more than three weeks are very unfavourable);
- monitoring of deforestation being able to increase the extent of the breeding biotopes and to require an increase of surveys in some areas.

This strategy should make it possible to better control important outbreaks of the Red Locust and the risk of a massive invasion. The Red Locust is also a problem of plant protection, with frequent, small and local outbreaks. The National Anti-Locust Centre will have to continue to provide assistance to the village communities for this plant protection aspect.

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